

INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT NO. 3456
DULUTH, SOUTH SHORE & ATLANTIC RAILROAD COMPANY
IN RE ACCIDENT
AT L'ANSE, MICH., ON
DECEMBER 14, 1951

SUMMARY

Date: December 14, 1951

Railroad: Duluth, South Shore & Atlantic

Location: L'Anse, Mich.

Kind of accident: Derailment

Train involved: Freight

Train number: 32

Engine numbers: Diesel-electric unit 204 and steam engine 717

Consist: 22 cars, caboose

Speed: Undetermined

Operation: Timetable and train orders

Track: Single; 7° curve; 2.80 percent descending grade westward

Weather: Clear; temperature, zero

Time: About 10:48 p. m.

Casualties: 2 killed; 2 injured

Cause: Excessive speed of train on a curve out of control on grade due to lack of coordinated action of crew as required by rules of carrier governing operation of trains on grades

Recommendation: It is recommended that the Duluth, South Shore & Atlantic Railroad Company promptly take necessary steps to obtain compliance with existing rules governing the operation of trains on grades, since it appears that the rules are adequate but that they were neither observed by the employees nor enforced by the carrier

INTERSTATE COMMERCE COMMISSION

REPORT NO. 3456

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

DULUTH, SOUTH SHORE & ATLANTIC RAILROAD COMPANY

May 12, 1952

Accident at L'Anse, Mich., on December 14, 1951, caused
by excessive speed of a train on a curve out of control
on a grade, due to lack of coordinated action of the
crew as required by the rules of the carrier governing
the operation of trains on grades.

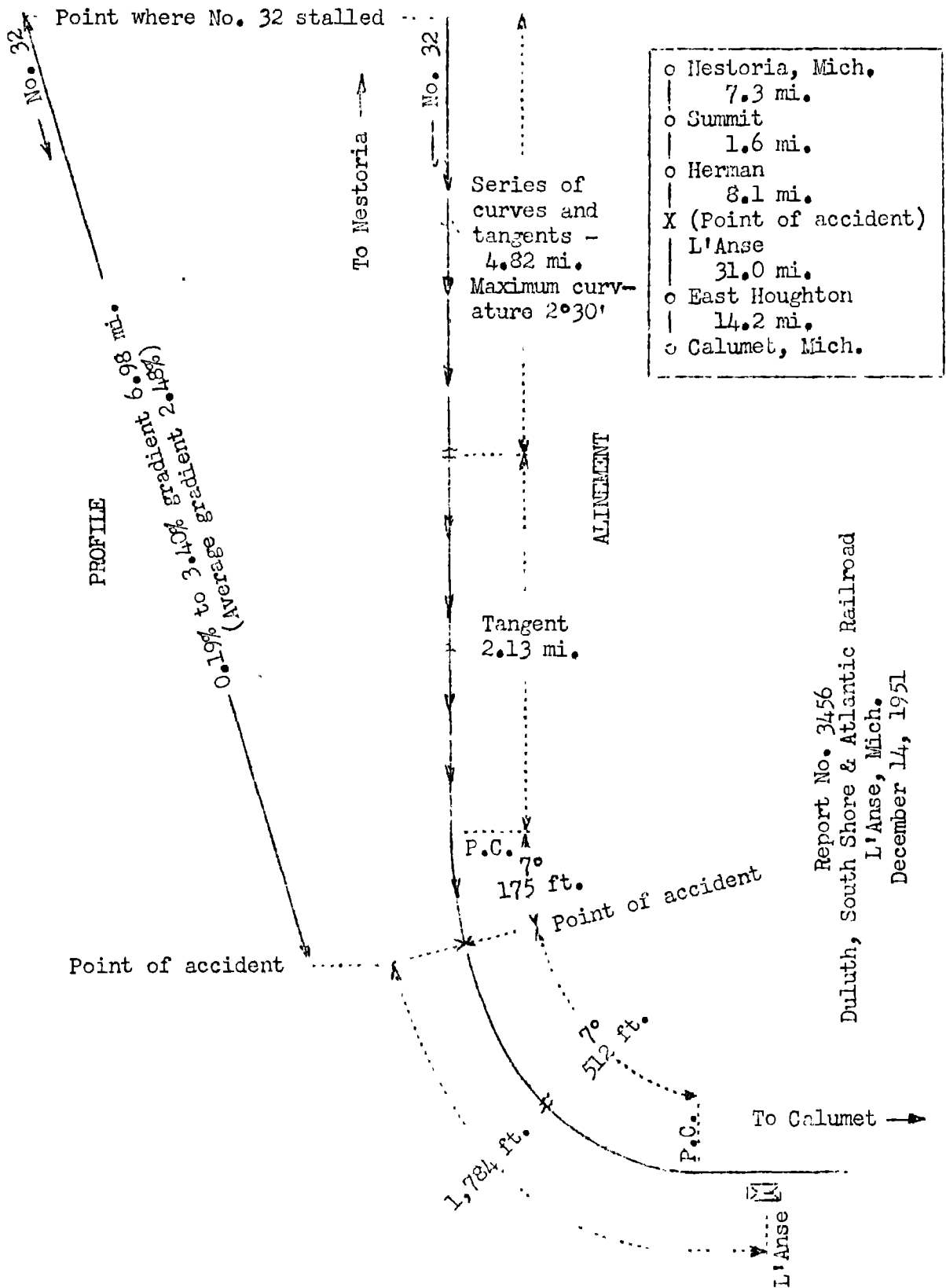
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On December 14, 1951, there was a derailment of a
freight train on the Duluth, South Shore & Atlantic Railroad
at L'Anse, Mich., which resulted in the death of two
employees, and the injury of two employees.

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Under authority of section 17 (2) of the Interstate Com-
merce Act the above-entitled proceeding was referred by the
Commission to Commissioner Patterson for consideration and
disposition.



Report No. 3456
 Duluth, South Shore & Atlantic Railroad
 L'Anse, Mich.
 December 14, 1951

Location of Accident and Method of Operation

This accident occurred on that part of the railroad extending between Calumet and Nestoria, Mich., 62.2 miles, a single-track line, over which trains are operated by timetable and train orders. There is no block system in use. The accident occurred on the main track at a point 45.54 miles east of Calumet and 1,784 feet east of the station at L'Anse. From the east there are, in succession, a series of curves and tangents throughout a distance of 4.82 miles, a tangent 2.13 miles in length, and a 7° curve to the left 175 feet to the point of accident and 512 feet westward. Throughout a distance of 6.98 miles immediately east of the point of accident the grade varies between 0.19 percent and 3.40 percent descending westward, and it averages 2.48 percent. At the point of accident the grade is 2.80 percent descending westward.

In the vicinity of the point of accident the track structure consists of 80-pound rail, 33 feet in length, laid in 1911 on an average of 18 treated hardwood ties to the rail length. It is fully tieplated, double-spiked on curves, and is provided with 4-hole 24-inch joint bars, and seven rail anchors per rail. It is ballasted with sand to a depth of 12 inches below the bottoms of the ties. At the point of accident the curvature is 7° and the superelevation is 3-1/2 inches.

This carrier's operating rules read in part as follows:

14. ENGINE WHISTLE SIGNALS.

* * *

The signals prescribed are illustrated by "o" for short sounds; "___" for longer sounds. * * *

* * *

Sound.

Indication.

* * *

(b) ___ _

Release brakes. Proceed.

* * *

(z) o _ o

Transfer of air brake control.

84. A train must not start until the proper signal is given.

307. * * *

Before engines are detached from a train on a grade, * * * a sufficient number of hand brakes must be applied on the low end of train to hold train; the air brakes must be released and the slack closed in against cars on which the hand brakes are applied.

When engine is recoupled to train, hand brakes must not be released until air brake system is fully recharged.

* * *

Air brake rules read in part as follows:

2. A terminal test of air brakes on all trains * * * must be made by car inspectors or trainmen before leaving terminal. * * *

8. After brake system on a freight train is changed to not less than 5 pounds below the standard pressure for that train, * * * a 15-pound service reduction must be made upon request or proper signal, brake pipe leakage noted (which must not exceed 7 pounds per minute) as indicated by the brake pipe gauge, after which the reduction must be increased to 20 pounds. If a road test, then an examination of the train brakes must be made to determine if brakes are applied in service application on each car. If a terminal test, the examination should determine piston travel to be correct (nominally 8 inches, and not less than 7 inches or more than 9 inches) and that brake rigging does not bind or foul.

When either test has been completed, proper release signal must be given and each brake examined to see that it releases properly.

* * *

12. When more than one engine is used on or in a train, the air brakes will be controlled from the leading engine. * * *

Under no circumstances shall the brake valve on any other engine in the train be cut in, either standing or running, except to apply brakes in case of emergency.

23. Whenever the engine handling the train is to be detached from train on a grade, the air brakes must be released, and a sufficient number of hand brakes must be set to insure holding the train before engine or cars are cut off. Following the recoupling of engine, the hand brakes must not be released until it is known that the air brake system has been fully recharged.

Instructions for operating and maintaining air brake and air signal apparatus read in part as follows:

Holding on Grades:

* * *

How long applied automatic brakes will hold cannot be known. They must not be depended upon, even in part, to hold a standing car, cars or train for even a short time on a grade. Instead, such must be held alone by hand brake or by the independent engine brakes * * * and not with the latter unless the train brakes are kept charged and ready for use. * * *

* * *

* * * Where there is a helper or a pusher engine in the train, the independent brakes on such must also be used to aid in holding the train while standing.

* * *

Always keep the independent brakes fully applied * * * when holding a train on a grade, * * *

* * *

The maximum authorized speed for freight trains was 40 miles per hour.

Description of Accident

No. 32, an east-bound second-class freight train consisting of Diesel-electric unit 204, 23 cars and a caboose, departed from East Houghton, 14.2 miles east of Calumet, at 6:30 p. m., 3 hours late. Switching was performed and cars were added to the train at several stations en route, and the train arrived at L'Anse at 8:25 p. m., with 29 cars and a caboose. Several cars were set off at L'Anse in order to reduce the weight of the train, helper engine 717 was coupled behind the caboose, and the train departed at 9:35 p. m., 2 hours 45 minutes late. The train consisted of 14 loads, 8 empties and a caboose, and the gross weight, exclusive of the locomotives and the caboose, was 1,211 tons. At a point 7.32 miles east of the station at L'Anse the driving wheels of the Diesel-electric unit slipped sufficiently to cause the train to stall. After the train stopped, the engineer of the Diesel-electric unit made a service brake-pipe reduction of 20 pounds. The Diesel-electric unit then was detached from the train and moved forward about 1,650 feet for the purpose of sanding the rails throughout this distance. When the Diesel-electric unit was recoupled to the train the engineer released the brakes preparatory to starting the train forward. After the brakes were released and before the train could be started forward, it started to move backward on the descending grade. Efforts to stop the train were not effective, and while moving at a speed variously estimated by members of the crew to have been between 30 and 70 miles per hour the entire train was derailed at a point 1,784 feet east of the station at L'Anse.

Engine 717 overturned to the north and stopped on its top and about 300 feet west of the point at which it overturned and 28 feet north of the track. The tender remained coupled to the engine. The derailed cars stopped in various positions on or north of the track. The most westerly car stopped 140 feet west of the tender of engine 717. Diesel-electric unit 204 stopped upright and in line with the track. The Diesel-electric unit and the first car were slightly damaged, the seventh and the sixteenth cars and the caboose were demolished, and the other cars and engine 717 and its tender were badly damaged.

The flagman of No. 32 and the fireman of the helper engine were killed. The engineer and the flagman of the helper engine were injured.

The weather was clear and the temperature was about zero at the time of the accident, which occurred about 10:48 p. m.

Engine 717 is of the 2-8-0 type. It is equipped with 6-ET brake equipment. The weight on the driving wheels is 203,580 pounds, and the total weight of the engine in working order is 230,140 pounds. The specified diameters of the engine-truck wheels and the driving wheels are, respectively, 33 inches and 55 inches. The driving wheelbase is 16 feet long, the total wheelbase is 24 feet 6 inches long, and the total length of the engine and tender, coupled, is 70 feet 5-1/4 inches. The tender is rectangular in shape and is equipped with two four-wheel trucks. Its capacity is 9,000 gallons of water and 14 tons of coal. The total weight when fully loaded is 175,660 pounds. The wheelbase is 20 feet 4 inches long, and the overall length is 29 feet 9-3/8 inches long. The last class repairs of engine 717 were completed August 10, 1950. The accumulated mileage since class repairs was 37,057. The last trip inspection and repairs were made at L'Anse on the day of the accident.

Diesel-electric unit 204 is of the 0-6-6-0 road switcher type. It is 58 feet in length. The weight in working order is 326,200 pounds. It is powered by a 1600-horsepower Diesel engine, and all wheels of each truck are driving wheels. The specified diameter of the wheels is 42 inches. It is provided with 6-SL brake equipment.

Neither locomotive was provided with a speed indicating or speed recording device.

Discussion

No. 32, consisting of Diesel-electric unit 204, 29 cars and a caboose, arrived at L'Anse at 8:25 p. m. In order to reduce tonnage, the seventeenth, eighteenth and nineteenth cars, the fourteenth car, and the sixth, seventh and eighth cars, were detached from the train, in that order. Members of the crew said that the train brakes were used during these operations and that they functioned properly. They also said that after the train was reassembled all angle cocks were in proper position and the brake-pipe pressure gage in the caboose indicated about 70 pounds. After helper engine 717 was coupled to the rear end of the train the air hose between the caboose and the helper engine were coupled, the angle cocks were opened and the double-heading cock under the automatic brake valve of engine 717 was closed. The front brakeman said that he inspected the south side of the train

while the brakes were applied and before the helper engine was attached to the rear of the train and that he did not observe any inoperative brakes. The engineer of the helper engine said that after that engine was coupled to the rear of the train its brakes were released from the Diesel-electric unit.

No. 32 departed from L'Anse at 9:35 p. m., with 14 loads, 8 empties and a caboose. The engineer and the fireman were in the control compartment of the Diesel-electric unit, the conductor, the front brakeman, the swing brakeman and the flagman of No. 32 and the flagman of helper engine 717 were in the caboose. The engineer and the fireman of helper engine 717 were in the cab of the engine.

About 6 miles east of L'Anse while the train was moving very slowly, it was observed that the brakes of the caboose and the rear car were sticking. They were released by manipulation of the release valves. About 1 mile farther eastward the speed of the train was reduced when the driving wheels of the Diesel-electric unit began to slip. There was a light covering of snow on the rails at several places on the ascending grade. The wheels continued to slip intermittently until the train stalled at a point 7.32 miles east of L'Anse. The grade was 3.1 percent ascending where the front of the train stopped and 3.3 percent ascending where the rear of the train stopped. The train stopped on a 2-degree curve to the left. The engineer said that after the train stopped he made a 20-pound brake-pipe reduction and then instructed the fireman to detach the Diesel-electric unit from the train. The fireman said that he closed the angle cocks on the rear of the Diesel-electric unit and the front of the first car before the air hose were uncoupled and that there was no backward movement of the train when the engine was detached. The engineer then, without giving any signals to the rear, moved the Diesel-electric unit eastward about 1,650 feet to clear and sand the rails to a point where the track was tangent and the grade more favorable. Soon after the train stalled, the fireman of the helper engine observed that the Diesel-electric unit was detached from the train and moving eastward. The engineer of the helper engine said that the automatic brakes were applied after the train stopped and that he then applied the independent brake, moved the reverse lever to full forward position and fully opened the throttle. The conductor said that immediately after the train stopped he started toward the front of the train to determine why the train had stopped. The swing brakeman and the front brakeman said that they left the caboose soon after

the conductor and started toward the front of the train. The flagman of No. 32 and the flagman of the helper engine remained on or near the caboose. The conductor and the two brakemen were on the north side of the train as they walked eastward and they were not aware that the Diesel-electric unit had been detached from the train and had moved forward until they approached the front of the train. The two brakemen said that as they proceeded toward the front end they inspected the train and observed the position of retainer-valve handles and the condition of hand brakes and that no retainer-valve handles were found in retaining position and no hand brakes were found applied. They said the air brakes on the caboose were applied after the train stopped and, although they did not inspect the air brakes on all of the cars, they did not observe any inoperative brakes.

The conductor arrived at the front of the train as the Diesel-electric unit was closely approaching and, after it was coupled to the train, he coupled the air hose and opened the angle cock on the first car and the fireman opened the angle cock on the Diesel-electric unit. They then entered the control compartment and the conductor was informed by the engineer that the train stalled because the driving wheels had been slipping and that the Diesel-electric unit had been detached to sand the rails. The front brakeman and the swing brakeman were alongside the train, from four to eight or nine cars from the engine, when the train brakes started to release and they then proceeded to the forward end of the train and entered the control compartment of the Diesel-electric unit. Both brakemen said that, although they had not received any instructions from the conductor as to what action was to be taken as a result of the train stalling, they thought it would be necessary to take a portion of the train up the hill and then come back for the remainder of the train, but that they did not turn any angle cock in the train nor drain the air from the reservoir of any of the cars.

The engineer of the Diesel-electric unit said that after the Diesel-electric unit was coupled to the train he applied the independent brake, placed the reverse lever in neutral position and opened the throttle to increase the speed of the air compressor. The statements relative to the period of time during which the Diesel-electric unit was coupled to the train before an attempt was made to start the train were conflicting. The engineer and the fireman of the Diesel-electric unit said that the brake system was being recharged during a period of from 10 to 15 minutes before the

train started to move backward. The engineer and the flagman of the helper engine said that the train started to move within 2 or 3 minutes after the Diesel-electric unit was coupled to the train. The front brakeman said that the train started to move soon after he entered the control compartment.

The engineer of the Diesel-electric unit said that the gages in the control compartment indicated 70 pounds brake-pipe pressure and 140 pounds main reservoir pressure. He thought the brake system of the train was properly charged although he did not lap the brake valve to check brake-pipe pressure. After the front brakeman entered the control compartment, the engineer sounded the proceed signal, released the independent brake and attempted to start the train in forward motion. The train, however, started to move backward down the grade. The engineer said that he closed the throttle, placed the reverse lever in reverse position and made a 10 or 12-pound brake-pipe reduction. He said that even before the exhaust at the brake valve was completed he was aware that the brake application was not going to be effective, and he therefore moved the brake valve to emergency position. He said the exhaust at the brake valve appeared to be normal and soon after initiating the emergency application he observed that the gage indicated no pressure in the brake-pipe. He said the train continued to accelerate down the grade and he told the other members of the crew who were in the control compartment that the brakes were not effective and to apply hand brakes. What this engineer did afterward is not clear because in his first statement he said that he attempted to recharge the brake system by placing the brake valve in running position and, after obtaining 70 pounds pressure in the brake pipe, as indicated by the gage in the control compartment, he again placed the brake valve in emergency position before closing the double-heading cock under his brake valve. Later he stated that after making the first emergency application he closed the double-heading cock so as to leave any further action up to the judgment of the engineer of the helper engine.

The conductor and the two brakemen said that after being informed by the engineer that the brakes were not effective they went out of the control compartment for the purpose of applying hand brakes on the cars in the train. They found that the first car in the train was a flat car loaded with lumber and that because of the speed of the train they could not climb over the lumber. They then returned to the control compartment and remained there until the Diesel-electric unit came to a stop after the accident.

The engineer of the helper engine stated that the Diesel-electric unit was detached from the train for about 10 minutes. About 2 or 3 minutes after he heard it couple to the train there was a heavy run-in against his engine, and although he had the independent brake applied, the reverse lever in full forward position and the throttle open, this caused his engine to move backward down the grade. He said that he had the side windows of the cab open but did not hear any signals. However, from the manner in which the train moved against his engine he gained the impression that it was the intention of those on the head end to move down the hill to a more favorable point for starting the train, and he then closed the throttle, reversed the engine and released the independent brake. He said that he did not feel any application of the brakes of his engine during the first mile of the backward movement and that the train continued to accelerate and, after moving about one-half mile down the grade, attained a speed which made him feel that something had gone wrong at the front end. He said that when the train had moved about one mile down the grade his brake-pipe gage indicated about 60 pounds pressure. He then opened the double-heading cock to his brake valve, placed the brake valve in full release position and adjusted the feed-valve for 90 pounds pressure. He said that he waited until the gage indicated 90 pounds brake-pipe pressure and then placed the brake valve in emergency position but felt no effective retardation. He also said that he made two more attempts to recharge the brake system and to apply the brakes but these applications were not effective. He estimated that only 5 or 6 minutes elapsed during the backward movement of about 7 miles and that the train attained a speed of about 70 miles per hour. He said that he observed sparks coming from the wheels near the middle or the front end of the train during the runaway movement down the grade.

The flagman of the helper engine said that soon after the Diesel-electric unit was coupled to the head end of the train he observed that the caboose gage indicated about 75 pounds brake-pipe pressure and he heard the release of the caboose brake. He said he immediately went out on the back platform of the caboose to listen for and to relay any signals from the front end of the train but that he did not hear any. He said the train slowly moved the helper engine backward about the length of the engine and then the engineer apparently reversed the engine and released the independent brake as the engine and train began to accelerate. He said that after the train moved backward about 100 feet there was a severe runout of slack and the train almost stopped, then he again looked at the gage inside the caboose and observed

that it indicated no brake-pipe pressure. He said the train then began to accelerate, and he started forward on the train to apply hand brakes. He turned up the handle on the retainer valve and applied the hand brake on the rear car but, although he was able to work forward to the fifth car from the rear, he was not able to apply any more hand brakes because of the excessive speed of the train. He said he saw sparks coming from the wheels along the train during the movement down the grade.

After the accident occurred the throttle of the Diesel-electric unit was found in closed position, the automatic brake valve was in holding position, the independent brake valve in applied position, the double-heading cock was closed and the angle cocks at the front and rear were closed. The engineer said that after the accident occurred he opened the double-heading cock and later closed the angle cock at the rear of the Diesel-electric unit because he heard air escaping through the broken air hose. All wheels and brake shoes of the Diesel-electric unit bore indications of excessive heating as a result of heavy braking.

The throttle of helper engine 717 was found closed, the reverse lever was in about the middle position and the double-heading cock was open. The handles of the brake valves were loose and their positions at the time of the accident could not be determined. The brake shoes of both the engine and the tender bore indications of excessive heating and the tires on all driving wheels on the left side and on two of the driving wheels on the right side were loose as a result of overheating.

All of the cars in the train were derailed and damaged to the extent that an air-brake test could not be made. The wheels and brake shoes on about 30 of the car trucks were examined after the accident and no indications of slid-flat spots or overheating were found.

There were no indications that helper engine 717 or its tender were derailed before they overturned. The calculated overturning speed for engine 717 on the curve where the accident occurred is 70 miles per hour.

The rules of this carrier provide that whenever the engine handling a train is to be detached from the train on a grade a sufficient number of hand brakes must be set to insure holding the train and the air brakes must be released before engine or cars are cut off. Also, that following the recoupling of engine, the hand brakes must not

be released until it is known that the air-brake system has been fully recharged. The investigation disclosed that trains frequently become stalled on the ascending grade between L'Anse and Summit and from the statements of an officer and several employees it is apparent that it has been a common practice to detach the leading engine to sand the rails, and to hold the train with a service application of the train brakes and the independent brake of the helper engine and without applying hand brakes. The investigation disclosed that it has been the practice for the engineer of the leading engine to sound the proceed signal in such cases and to start the train even though no signal is received from the rear. In this case no signal was received from the rear of the train before an attempt was made to start the train.

The brakes of this train apparently functioned properly up to the time the train stalled, although a terminal test of the air brakes, as required by the rules of this carrier, was not made before the train left the terminal. All of the cars in this train and the caboose were equipped with AB brakes. The engineer of the Diesel-electric unit said that although he did not make a leakage test it appeared that there was very little brake-pipe leakage in the train. According to statements introduced at the investigation, the brake-pipe was open throughout the train and charged to about 70 pounds pressure as the train proceeded eastward up the grade. After the train stalled near milepost 10, a 20-pound brake-pipe reduction was made. This should have resulted in approximate equalization of pressure in the brake cylinders and the auxiliary reservoirs of about 50 pounds. The emergency reservoirs would retain pressure of about 70 pounds. The Diesel-electric unit was detached from the train for a period of time variously estimated to be from 3 to 10 minutes. After the engine was recoupled to the train the air hose between the engine and first car were coupled, and the angle cocks were opened. The brake-pipe was recharged to about 70 pounds pressure as indicated by the gage in the Diesel-electric unit and employees at both the head and rear ends of the train heard the brakes starting to release. As air from the emergency reservoirs of AB brake equipment is permitted to flow into the auxiliary reservoirs during release, it would appear that an equalization pressure of not less than 55 pounds should have been obtained in the reservoirs of all cars not having excessive leakage. It is probable that with this short train the brake-pipe pressure was increased at a sufficient rate to cause all AB valves to move to retarded-recharge position, and there would have been

only a slight increase in reservoir pressure if the automatic brake valve of the leading engine immediately afterward was placed in application position. With brake-pipe pressure of 70 pounds and auxiliary reservoir pressure of about 55 pounds a service-rate reduction of 15 pounds or less would not cause a brake application. The engineer of the Diesel-electric unit said that he placed the brake valve in emergency position immediately after making a 10 or 12-pound reduction and that the exhaust at the brake valve was normal and the brake-pipe gage indicated no pressure. While this would indicate that emergency operation was obtained, full emergency brake cylinder pressure could not be secured under these circumstances. With auxiliary and emergency reservoir pressure of about 55 pounds, approximately 47 pounds brake cylinder pressure, or practically a full-service application of the brakes, should have been obtained. However, because of the 3-stage build-up of brake cylinder pressure from an emergency application, it would require from 8 to 10 seconds to obtain the maximum brake-cylinder pressure after the valves moved to emergency position. With a reservoir pressure of 55 pounds the vent valves would probably remain open for a period of from 47 to 55 seconds. It would appear that, with a train consisting of 22 cars and a caboose, about 1,210 tons excluding the caboose, unless the rate of speed already was excessive, a brake application resulting in about 45 pounds brake-cylinder pressure and being held in effect for a period of from 45 to 55 seconds should have had an effective retardation on the train. Apparently the double-heading cocks of the brake valves of both engines were open throughout the second mile of the runaway movement down the grade and action taken to obtain brake applications at one end of the train was no doubt nullified by the action at the other end of the train. The attempts which apparently were made to recharge and apply the brakes in rapid succession were ineffective and resulted only in further depleting the effective reservoir pressure.

The investigation disclosed that a number of rules which are essential to the safe operation of trains on grades were not complied with. The prescribed terminal test of the brakes was not made at the initial terminal; a proper test of the train brake system was not made at L'Anse where the consist of the train was changed; hand brakes were not applied to hold the train on the grade when the Diesel-electric unit was detached from the train; proper measures were not taken to insure that the train brake system was fully recharged before attempting to proceed after the Diesel-electric unit was recoupled to the train, and the prescribed signal was not given for transfer of air brake control from the Diesel-electric unit to the helper engine at the rear of the train.

Cause

It is found that this accident was caused by excessive speed of a train on a curve out of control on a grade, due to lack of coordinated action of the crew as required by the rules of the carrier governing the operation of trains on grades.

Recommendation

It is recommended that the Duluth, South Shore & Atlantic Railroad Company promptly take necessary steps to obtain compliance with existing rules governing the operation of trains on grades, since it appears that the rules are adequate but that they were neither observed by the employees nor enforced by the carrier.

Dated at Washington, D. C., this twelfth day of May, 1952.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.